



RAS-1R



U.S. AIR FORCE

*Intelligence, Surveillance, and Reconnaissance
Management Directorate*



SIWG-10

Daryl Robertson

WR-ALC/LXAS

This briefing is unclassified



OVERVIEW



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Intelligence, Surveillance, and Reconnaissance Management Directorate

- **Sensor Pictorial**
- **Sensor Delivery Status**
- **Updates/TCTO**
 - **PME-1 Briefed by Kim Thomas**
 - **PME-2 Briefed by Karl Parks**
- **Lite Overview**
- **FARSITE Installation**
- **Issues**



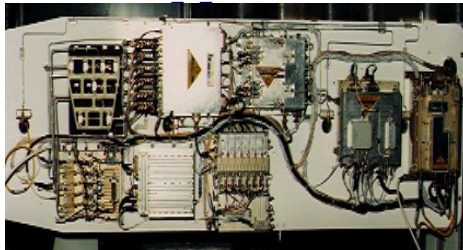
RAS-1R

Equipment Locations



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Directed



RF Pallet



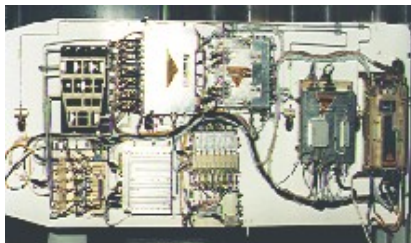
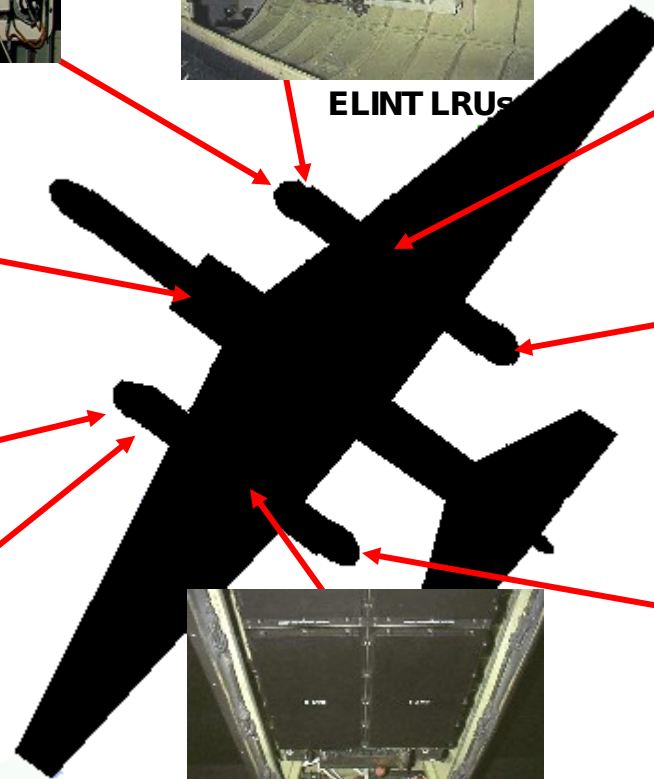
ELINT LRUs



Liquid Cooled Rack System



RFD Preamp



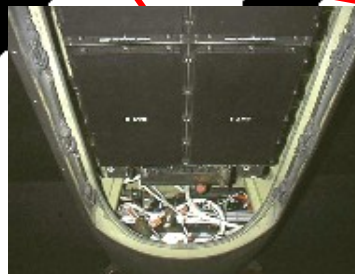
RF Pallet



Link Interface/ATM Switch



ELINT LRUs



Liquid Cooled Rack System



Preselects RFD



DELIVERY STATUS



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		GFE Sensor	Deliver to Site 2		Available to Beale
System	s/n	Date Req'd	PME 1	PME 2	Ship Date
1	71041	complete	complete	complete	complete
2	72042	complete	complete	complete	complete
3	74044	complete	complete	complete	complete
4	78043	complete	complete	complete	complete
5	76047	complete	complete	complete	complete
6	77048	complete	complete	complete	complete
7	73049	complete	complete	complete	complete
8	75045	complete	14-Dec-04	complete	16-Mar-05
1R Lite		na	23-Oct-04		



UPDATES/TCTO



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- **PME-1 - Details presented by Kim Thomas/Raytheion**
 - **MSW V10.1A Fielding Approved**
 - **MSW V10.2 In Work**
 - **ERB Review Aug 04**
- **PME-2 - Details presented by Karl Parks**
 - **MSW 3.1.0 ERB/CCB Approved**
 - **Awaiting flight test**
 - **WB Sensitivity ERB/CCB Approved**
 - **Awaiting flight test**
 - **PPC-4A CSPA In Work**
 - **ERB Review Aug 04**



PME-1 Mission SW Status



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Current Baseline changes



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- **PME-1 S/W V10.1a - Version 10.0 (QN) plus 30 software fixes**
- **Status - Delivery of TCTO in progress**
 - **Asset allocation problem has been corrected.**
 - Coding error in V10.0 reduced available collection assets from 88 to 42.
 - **Improved audio quality (3 fixes).**
 - **Several memory leaks corrected (4 fixes).**
 - **Corrected Signal Qualification (SQ) errors under heavy load.**
 - Consequence/improvement of this fix unknown
 - **QUICKNOTCH - TAS Timing Enhancement**
 - **PME-2 Interface Change (Aligns with PME-2 baseline 3.1)**
 - **Many other miscellaneous changes (23 fixes)**



Upcoming Baseline changes



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- **PME-1 S/W V10.2 - Planned late October 04**
- **Status - CR/DR work in progress**
 - Re-distribution of software tasks to reduce processor loading (Power PC 44)
 - CCTL modifications to improve PME-2 Interface to the SDA
 - Multiple changes to fix memory leaks and improve overall system stability
 - DF modifications to improve Time of Day and SysCal
 - QUICKNOTCH 1-bit data corruption fix
 - Bistatics master assignment deletion and reallocation fix
 - Extended link outage recovery



PME-2 MSW 3.1.0



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Modification Description



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- **PME-2 MSW Version 3.1.0**
 - **Supports WB Sensitivity improvement**
 - **Supports upgrade of CSPA Single Board Computers (SBCs) from 2A to 4A**
 - **Steerable Dish Antenna (SDA) software change**
 - **Resolves allocation & control problem**
 - **When PME-1 resets, PME-2 retains allocation**
 - **Orbix removed**
 - **Orbix is VVI and does not have driver support for new SBCs**
 - **Boot ROM changes required for Orbix removal**



Status



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– PME-2 MSW Version 3.1.0

- Software Development - Complete
- Factory Regression test - Complete
- Ground Rings with GCP at Palmdale - Complete
- SIL testing completed at Palmdale
- Flight test on PDM 108 - On Hold
- TCTO 12S-RA-513 - Submitted / awaiting flight test prior to approval
- ERB Approved June 8th
 - Field TCTO after completion of successful flight test
- CCB Approved June 22nd



Issues



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- **PME-2 MSW Version 3.1.0**
 - **Wideband Sensitivity and CSPA upgrade is pending the following:**
 - **Flight Test of PDM 108 (on hold)**
 - **TCTO 12S-RA-513 approval requires flight test**



Risk and Mitigation (Con't)



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- **Delivery of MSW 3.1.0 without full system flight testing**
 - **Risk: some unforeseen anomaly - very low**
 - **PME-2 Kit 108 ATP tested with 3.1.0 at plant**
 - **Ground rings performed with GCP at Palmdale successfully**
 - **SIL test performed at Palmdale successfully**
 - **Mitigation: fly on Kit 107 at Beale before fielding to other sites**



PME-2 WB Sensitivity



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Modification Description



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- **Improves WB Mode Sensitivity**
 - Approximately 6 dB or better improvement
 - 10 dB improvement seen during lab testing at Palmdale on system 108
 - Affects each of 3 WB Processor Modules in DFPA LRA
- **WB Mode increases probability of intercept for signals of interest (SOI)**
 - Enables scanning through the RF spectrum faster
 - Revisit time for specific frequencies improved
 - Increased WB sensitivity improves receiver detection range in WB Mode



Status



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- **Engineering checkout of design changes - Complete**
- **Factory Regression test - Complete**
- **Ground Rings with GCP at Palmdale - Complete**
- **Flight test on Kit 108 - On Hold**
- **WB Modules currently in plant for reATP of modules**
 - **Initial plan was to flight test with red tagged modules but with the delay of Kit 108, time is available to complete reATP**



Issues



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- Flight Test of Kit 108 on hold**
 - Unable to flight test modified WB Modules**
 - Completion of flight test required for TCTO 510 approval and fielding of modified WB Modules**
- Retest of all modified WB Processor Modules for the fleet is unfunded**



Risk and Mitigation



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- **Delivery of WB Sensitivity mods without full system flight testing**
 - **Risk :**
 - **More signals may be detected resulting in higher processing load for GCP (low)**
 - **Mitigation :**
 - **Model GCP loading**
 - **Use higher thresholds**
 - **Tailor scan commands to use WB mode in lower density frequency ranges**



PME-2 CSPA PPC Update



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Modification Description



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- **Upgrade SBC in CSPA from 2A to 4A**
 - **Makes available 2A SBCs (GFE) for use by PME-1**
 - **Enables Common SBC technology across all assemblies**
 - **Address VVI issues with 2A availability**
 - **Provides increased processing (expound on) throughput**



Status



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- **Radstone under contract**
- **First SBC module expected in Sept 2004**
- **Fielding planned for first quarter of CY 2005**



Risk and Mitigation (Con't)



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- **Delivery of CSPAs without full system flight testing**
 - **Risk :**
 - Interfaces to other equipment will not have been tested exercised at AC systems level
 - **Mitigation :**
 - Flight (or SIL) test using RAS-1R Lite
 - Tests 1553 interface
 - Tests ATM interface
 - VA power requirements can be checked against previous CSPA
 - Temp/altitude test modified CSPA at system level using Depot Level Test Set prior to delivery



LITE OVERVIEW



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- **Partial (25%) RAS-1R PME-1 for aircraft Post-PDM DF calibration**
- **Functionality**
 - **Collection (1 channel)**
 - **Direction Finding**
 - **Spectrum Display (1 channel)**
 - **Built in Test**
 - **Control of the Steerable Dish Antenna**
- **Delayed due to availability of GFE (ALF)**
- **Delivery to flight test 23 Oct 04**



FARSITE Installation



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Frequency Agile Radar Simulator with Integrated T

- **Transmits Calibration/Test signals for PME-2**
- **Will also support U-2/GH HBS/ASIP testing**

- | | |
|---------------------------------|---------------------|
| • Contract award | ✓ Feb 04 |
| • Facilities Mod Request | ✓ Mar 04 |
| • Frequency Mgmt | ✓ Mar 04 |
| • Approval | ✓ Jul-Oct 04 |
| • Non-radiated checkout | – Feb 05 |
| • Temp Site Operation | – Mar 05 |
| • Perm Site Operational | – Apr 05 |
| • Operational Checkout | |



ISSUES



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- **PME-1**
 - **Sensor #75 (108)**
 - **Damaged during SIL test**
 - **Status update Jim Godfrey/LXAS & Kim Thomas/Raytheon FC**
 - **Liquid Cooled Rack Systems (LCRS) Depot Support Equipment**
 - **Currently very rudimentary**
 - **Manual procedure using spare CCAs**
 - **On contract**
 - **Delivery Dec 04**
 - **Automated & dedicated capability**
 - **Funding being investigated**



ISSUES



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- **PME-2 depot relocation**
 - **Anechoic Chamber**
 - New chamber built by Rivet Joint to be in operation starting FY06
 - Requires software change for new equipment
 - Requires some hardware
 - Funded
 - **Lab sensor ATP capability**
 - New location and new equipment
 - Funded
 - **Lab box level (LRU) ATP capability**
 - Unfunded
 - FY05 requirement
 - **Environment Lab equipment (EMI, Shake table & Temp/Altitude)**
 - Unfunded
 - FY05 requirement, Priority is Temp/Altitude



Test Limitation



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- **RAS-1R Flight Test Support after Sensor #108 delivery**
 - **PME-1**
 - **LITE available for calibration of PDM Aircraft**
 - **Depot sensor (DLM) partial PME-1 (80%)**
 - **Used for ATM flight test**
 - **Interferes with depot support of OLs**
 - **No programmed/funded capability**
 - **For use to resolve field problems**
 - **Test changes prior to fielding**
 - **PME-2**
 - **Sensor with EAU arrays until kits complete flight test**
 - **No programmed/funded capability**
 - **For use to resolve field problems**
 - **Test changes prior to fielding**
 - **Bottom Line: Software updates after 108 flight test will field without flight testing**



Backup



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BACKUP SLIDES



MSW 3.1.0 Overview



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- **Modification Description**
- **Issues**
- **Schedule**



MSW Functions



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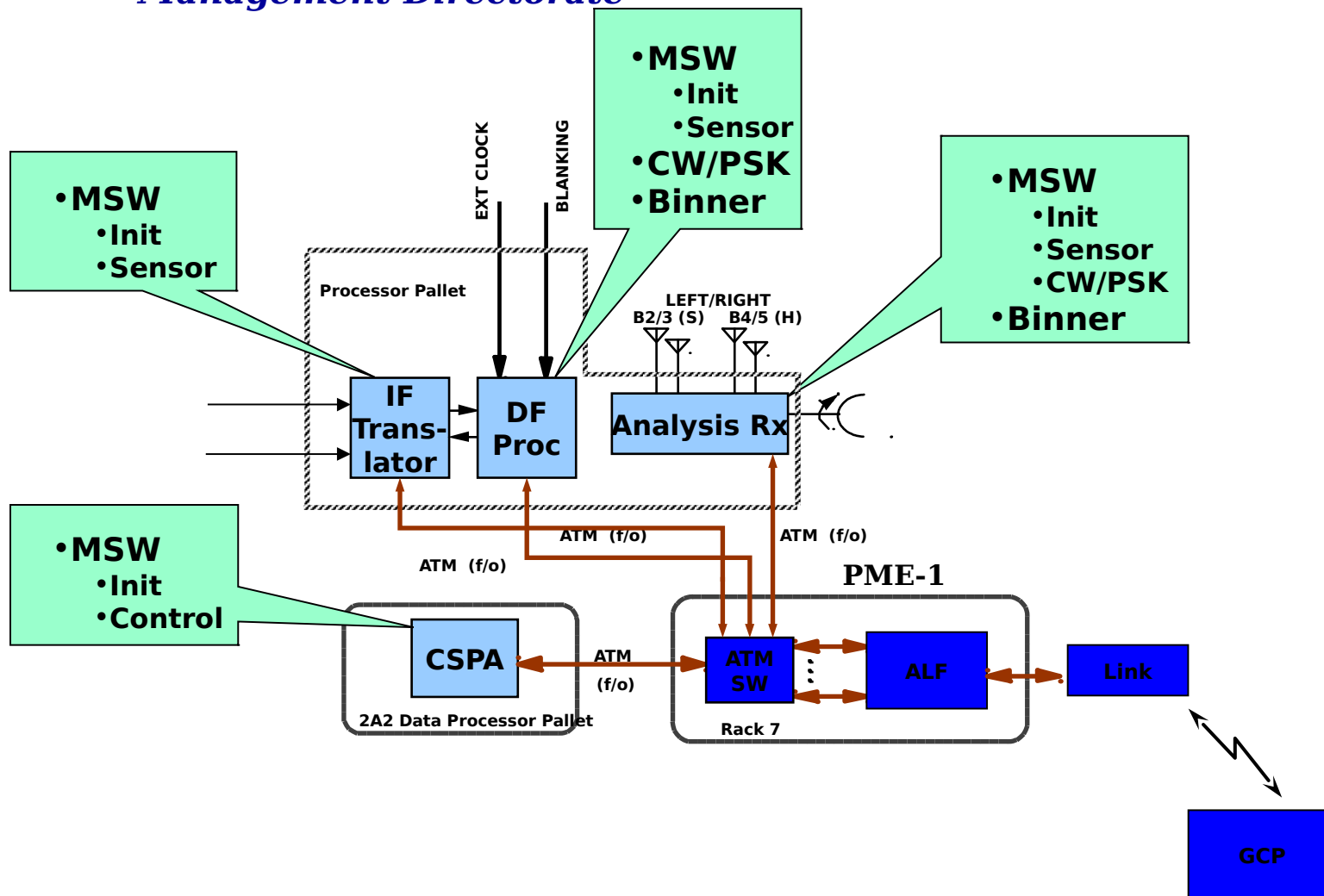
- **MSW executes primarily on SBCs located in CSPA, DFPA, IFTA and AR LRAs**
- **Responsible for interfacing with external command and control**
 - **GCP**
 - **PME-1 SDA Control and status**
 - **Provides PME-1 with Nav data**
- **Executes scans**
 - **Configures VME modules and remote assemblies**
 - **Processes PDW data**
- **Executes system calibration and BIT**



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Block Diagram

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Dependencies



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- **Requires PME-1 software version 10.1/A**
- **Required for WB Sensitivity improvements**
- **Required for CSPA SBC upgrade**
- **Requires installation by plant personnel**



Risk and Mitigation



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- **Risk: Delivery delayed due to full system flight test options**
 - MSW 3.1.0 ready for flight test
 - Required for CSPA SBC upgrade
 - Delays availability of SBC 2As for PME-1
 - Required for WB sensitivity improvements
 - Kit 108 not available for flight test until Jan 2005
- **Mitigation: Approve TCTO with out flight test at Palmdale.**



WB Sensitivity Overview



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- **Modification Description**
- **Issues**
- **Schedule**



WB Asset Functional Description



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- **WB asset channelizes WB BW into 6 channels (10 for EAU)**
 - **WB asset consist of Analog Filter module used to channelize IF**
 - **WB Processor modules (3) used to detect and measure signals**
 - **WB Arbiter Module used to arbitrate steering of NB asset**
- **Each channel detects pulses and makes parameter measurements**
 - **Pulse frequency measurements are used to steer the NB asset to make additional amplitude, frequency, TOA and phase(AOA) measurements**

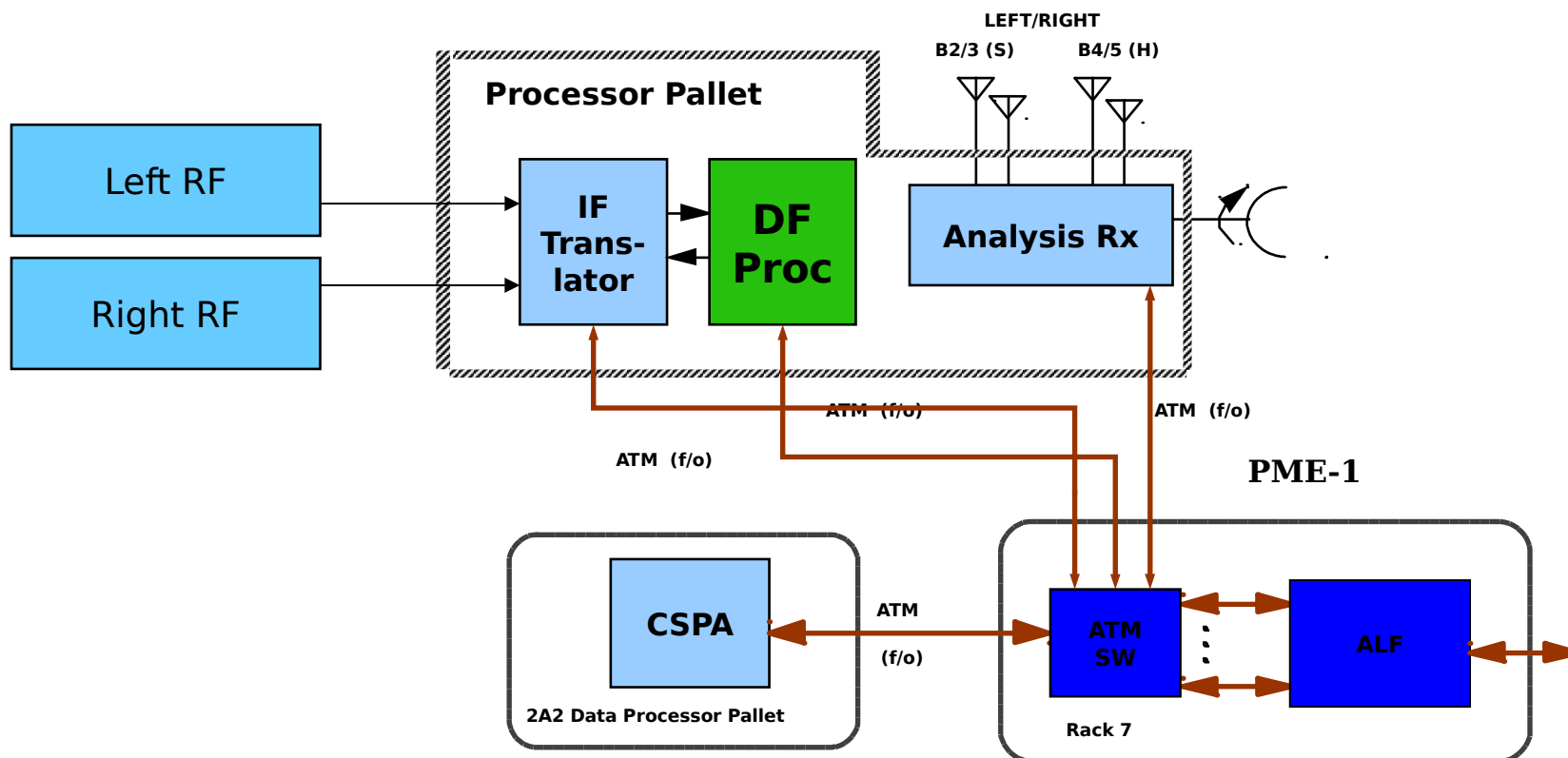


Modification Description (cont.)



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DF Processor Assembly



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1	(COTS)	Single Board Computer/ATM PMC
2		Spare
3		Spare
4	(COTS)	DSP (CW/PSK)
5	51100	CW/PSK
6		Spare
7		Spare
8	51200	WB Arbiter
9	51300	WB Channelizer
10	51400	WB Processor 1
11	51450	WB Processor 2
12	51500	WB Processor 3
13	(COTS)	DSP (Binner/Formatter)
14		Spare
15	51600	Detector/TOA
16	51700	DF Amplitude/Frequency Measurement
17	51800	Phase Measurement
18		Phase Measurement
19	51900	DF Processor Interface
20	(COTS)	Power Module
21	(COTS)	Power Module
EMI Filter (Elapsed Time Indicator) ETI		



- 51400, 51450, 51500 Modules affected
- Change results in new part numbers for each module
- Video filter inductor value change
 - 8 places each module
- 3 FPGA EEPROMs reprogrammed
 - Each module



Interfaces



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- **SWaP not affected**
- **No external interfaces affected**



Dependencies



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- **Requires PME-2 MSW version 3.1.0 or later**
- **MSW version 3.1.0 requires PME-1 MSW 10.1/A or later**
 - **Coordination with PME-1 SW deliveries on going**



Status (Con't)



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- TCTO 12S-RA-509 -**
 - Modify WB Processor Modules**
 - Submitted to ERB and CCB**
 - Approved June 7th**
- TCTO 12S-RA-510**
 - DFPA: Install WB Processors 1-3**
 - Submitted / Waiting for approval**



Risk and Mitigation



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- **Risk: Delivery delayed due to full system flight test options**
 - **SOIs may not be detected in the field**
 - **Modified WB Modules will be available prior to systems being flight tested**
 - **Kit 108 available for flight test Jan 2005**
 - **Heavy schedule pressure**
- **Mitigation: Field WB Sensitivity Modifications without flight testing at Palmdale**



CSPA PPC Overview



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- **Modification Description**
 - **Technical description**
- **Issues**
 - **Dependencies**
- **Schedule**



CSPA Description



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- **CSPA provides Command/Control interface to the PME-1 AR and DF Receivers**
 - Stores and distributes scan commands
 - Combines, delivers Scan data and status (Calibration, BIT) information to GCP
- **Manages interfaces to other systems**
 - Receives 1553 nav data
 - Provides Nav, SDA Control/Status, Boot Up, Uplink, downlink interfaces to PME-1
- **Provides platform for growth options**
 - Additional On-Board processing
 - On Board Mass Storage
 - Addition of IMU processing

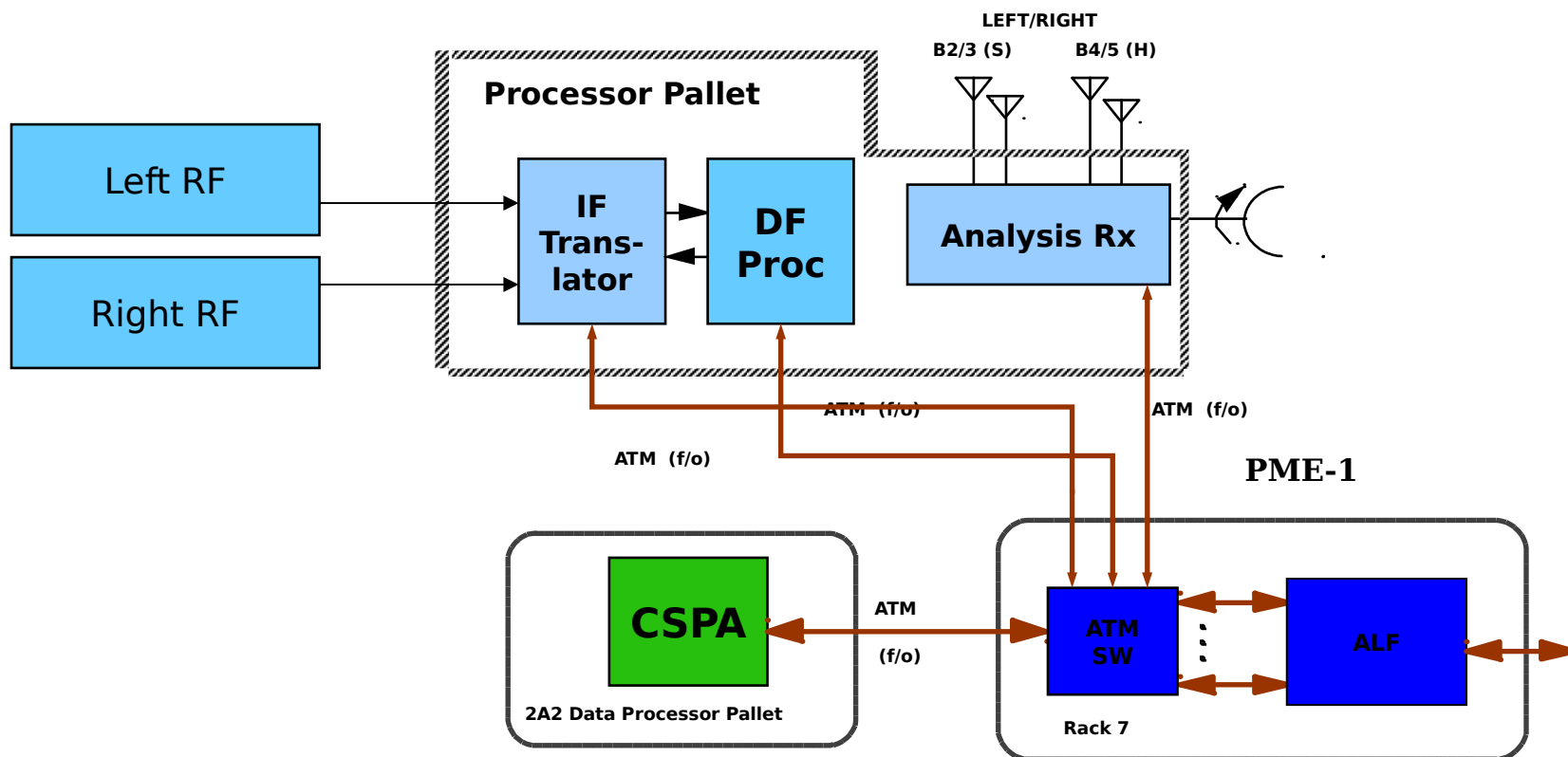


Modification Description (cont.)



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Control Sensor Processor Assy



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1	(COTS) Single Board Computer
2	(COTS) ATM/1553B PMC
3	Spare
4	Reserved
5	Spare
6	Reserved
7	Reserved
8	Spare
9	58600 CSPA Interface
10	Spare
11	(COTS) Power Module
EMI Filter (Elapsed Time Indicator) ETI	



- ATM/1553B PMC carrier card removed
- ATM and 1553B PMC modules mounted onto 4A SBC PMC sites



Interfaces



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- **No external interfaces affected**



Dependencies



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- **Requires PME-2 MSW version 3.1.0 or later**
- **MSW version 3.1.0 requires PME-1 MSW 10.1/A or later**
- **CSPA SBCs will have a different part number than SBCs in other LRAs**
 - **Part number change driven by requirement to route PMC I/O to P2 Connector instead of serial interfaces**



Status (Con't)



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- **TCTO 12S-RA-514 -**
 - **Replace 2A SBC with 4A**
 - **Start of TCTO development planned for Aug 04**
 - **Submittal planned for late Sep 2004**
- **TCTO 12S-RA-515**
 - **Install modified CSPAs into fielded systems**
 - **Start of TCTO development planned for Aug 04**
 - **Submittal planned for early Oct 2004**



Issues



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- **Delivery of CSPAs delayed due options for flight test**
 - **Flight Test platform needs identified**
 - **Kit 108 flight testing planned for first qtr '04**
 - **Kit 108 recommended to limit new items being tested during RAS-1R/EAU Niledrive flight test**
 - **RAS-1R/EAU Niledrive (System 051) second option**
 - **Significant new capabilities being tested on this system already**



Risk and Mitigation



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- **Risk: Delivery delayed due to full system flight test options**
 - CSPA ready for flight test October 2004
 - Delays availability of SBC 2As for PME-1
 - Kit 108 available for flight test Jan 2005
 - RAS-1R/EAU Niledriver (System 051) available for flight test February 05
- **Mitigation: Field modified CSPAs without full flight test**